DOCUMENT RESUME

ED 331 404 HE 024 462

AUTHOR	Gale, James R.
TITLE	Foreign Students in a Regional Economy: A Method of Analysis and an Application. IIE Research Report Number Seventeen.
INSTITUTION	Institute of International Education, New York, N.Y.
REPORT NO	ISBN-87207-171-X
PUB DATE	88
NOTE	53p.
AVAILABLE FROM	Institute of International Education Inc., 809 United Nations Plaza, New York, NY 10017 ($4.00).
PUB TYPE	Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Accounting; *Economic Impact; *Foreign Students; Higher Education; International Trade; Local Issues; Regional Planning; *Research Methodology; Statistical Data
IDENTIFIERS	*Michigan Technological University

ABSTRACT

The study developed a general method for analyzing the economic impact of international university students on a local or regional economy and applied the methodology to Michigan Technological University. Major findings included the following: international students accounted for $2,693,814 in total direct and indirect expenditures in the region for the 1986-87 academic year, or $11,319 on a per student basis. International students also maintained substantial balances in bank transactions and savings accounts. The first chapter presents the general framework used in the analysis based upon national income accounting concepts and definitions and student expenditures. Chapter 2 describes the equations used in the economic impact study. Chapter 3 discusses data sources and data collection and suggests statistical techniques for selecting a sample of students (in this case 35 students from a population of 238 international students). Chapter 4 presents data related to Michigan Technological University, and chapter 5 discusses the effects of financial transactions by international students on regional financial institutions and flow of funds. Chapter 6 considers additional demographic material, and the last chapter presents conclusions, implications, and applications of the model on a larger scale and to different regions. The questionnaire used to survey international students is included in an appendix. Eight references. (DB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED331404

IIE Research Report Number Seventeen

foreign students in a regional economy

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

IIE

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

A METHOD OF ANALYSIS AND AN APPLICATION

JAMES R. GALE: Michigan Technological University

A Report Prepared for the Institute of International Education

INSTITUTE OF INTERNATIONAL EDUCATION
809 UNITED NATIONS PLAZA, NEW YORK, 10017

HE024962

BEST COPY AVAILABLE

Copyright © 1988

INSTITUTE OF INTERNATIONAL EDUCATION INC.
809 UNITED NATIONS PLAZA
NEW YORK, NY 10017

All rights reserved
ISBN 87207- 171-X
Printed in the United States

Contents

INTRODUCTION X
1: FRAMEWORK FOR ANALYSIS 5
2: A REGIONAL ECONOMIC IMPACT MODEL FOR INTERNATIONAL STUDENTS 9
3: DATA SOURCES AND DATA COLLECTION 14
4: MODEL AND DATA APPLICATION TO THE SPECIFIC CASE AT MTU 17
5: FINANCIAL DATA 25
6: DEMOGRAPHICS, VISITORS, AND MISCELLANEOUS 28
7: SUMMARY AND OPPORTUNITIES FOR FUTURE RESEARCH 30
APPENDIX A 32
APPENDIX B 37
APPENDIX C 39
APPENDIX D 40

List of Figures and Tables

FIGURE 1. ROLE OF INTERNATIONAL STUDENTS IN A REGIONAL ECONOMY

TABLE 1. AVERAGE MONTHLY EXPENDITURES BY GROUPS OF INTERNATIONAL STUDENTS

TABLE 2. HOUSING LOCATION OF INTERNATIONAL STUDENTS, 1986-7

TABLE 3. AVERAGE YEARLY DIRECT EXPENDITURES IN THE LOCAL ECONOMY BY GROUPS OF INTERNATIONAL STUDENTS AT MTU

TABLE 4. TOTAL DIRECT EXPENDITURES BY INTERNATIONAL STUDENTS IN THE LOCAL ECONOMY

TABLE 5. MTU STUDENT ENROLLMENTS AND HOUSING LOCATION

TABLE 6. CLASSES OF EXPENDITURES BY MICHIGAN TECHNOLOGICAL UNIVERSITY, 1986-87

TABLE 7. PARAMETERS AND VARIABLES FOR ECONOMIC IMPACT ASSESSMENT

TABLE 8. ECONOMIC IMPACT ESTIMATE AND SENSITIVITY TO VARIATIONS IN INTERNATIONAL STUDENT ENROLLMENTS

TABLE 9. TRANSACTIONS DEPOSITS AND SAVINGS DEPOSITS OF INTERNATIONAL STUDENTS

Acknowledgments

The origination of the idea to study the role of international students in an economy stemmed from Elinor Barber. It was her encouragement and the support of the Institute of International Education which made the accomplishment of this study possible. Stephen Dresch, Dean of the School of Business and Engineering Administration at Michigan Technological University, willingly read and edited earlier versions of the study. His insightful suggestions and constructive criticisms only strengthened the study. Several individuals at Michigan Technological University were very helpful in carrying out the study. Mary Ann Brunner, the International Student Advisor, and her assistant, Karen Anderson, generously assisted in the structuring of interviews. It was their familiarity with international students which eased the interviewing process for the study. William Eilola and Michael Salmela supplied critical budget data without complaint. Last, but most certainly not least, the international students at Michigan Technological University cooperated graciously and willingly in the collection of actual data. If this study assists or benefits any international student directly or indirectly, then it is a worthwhile effort.

Introduction

The economic effects of an institution of higher learning on an economy depend upon a number of economic variables and relationships between that entity and the economic units within the given local economy. [1] To assess the economic effects requires the collection of relevant economic data from the university and application of those data to the regional economy. Thus, studies of university impacts are generally case-specific but are based upon general economic models which take into account direct and indirect expenditures by the faculty and staff, students, and the university itself.

One class of expenditures which is a significant part of total expenditures attributable to a university is spending by students in the local economy. Caffre and Isaacs (1971) suggest that student-driven expenditures are an important part of assessing a university's economic effect. Gale and Jambekar (1975) found student expenditures to be the largest single component of Michigan Technological University's impact on the local economy. Estimates of mean student expenses published by the College Entrance Examination Board (1986) also indicate that student expenditures are not a trivial part of a university's role in an economy.

[1] Hereafter, the term university will refer to any institution of higher learning whether it is a university, college or junior college.

The role of international students has not been studied in this context before, yet, international students make a unique contribution to a regional or national economy for a number of reasons. First, international students purchase goods and services and add to final sales in the region. Secondly, to the extent that international students receive funding from foreign sources, their education is treated as an export of services. Thus, in a broader context, not only does the local economy receive an influx of funds, but the balance of payments on the current account for the United States is positively influenced by these international students. [2] Thirdly, since the 1970's, the proportion of the student body comprised of international students, especially at the graduate level, has been increasing in the United States.[3] Accordingly, spending patterns of international students are an increasingly important factor as far as economic impacts are concerned, especially at the regional economy level. Fourthly, international students acquire financial assets in the United States (in particular, demand and savings deposits at banks) and provide a source of funds to domestic financial institutions. Some international students receive domestic funding. For these students, an accumulation of a modest amount of U.S. dollars may mean significant wealth in the student's home country when the dollars are converted back to the domestic currency. Fifthly, international students who have been attending U. S. universities are aware of U.S. customs, business practices, and market opportunities. They are potential future business trading customers for U.S. products and potential suppliers of products to U.S. markets. In a sense, current international students are a potential and significant source of U.S. exports and imports for the next fifty years.

The purpose of this study is to develop a general method for analyzing the economic impact of international students on a local or

[2] On the other hand, if international students receive external funding, these funds may be deflected from expenditures on other U. S. exported goods and services. In this instance, the balance of payments would not be affected favorably, but at the expense of other products. If international students are required to pay taxes on funds received from external sources, their spending would be reduced accordingly.

[3] At the graduate level, the proportion of international students is higher than at the undergraduate level and is growing at a significant rate. One consequence of this phenonmenon has been noted by Dresch, 1987. In general, as international graduate students are used for instructional purposes and as they move into faculty positions, the salaries of all faculty members (domestic included) are lower than what they would be without this influx of international faculty. Thus, incomes in a given region where a university with a disproportionally high representation of international faculty are present may mean lower income in the region than would be the case without international faculty. This matter is a side issue which gets away from the concentration on international students, but one which bears mentioning at this point.

regional economy and to apply the methodology to a specific university in Michigan. The focus will be on international students as opposed to all students. Special attention will be given to spending patterns, travel, sources of funds, and saving characteristics of international students. Obviously, the relative economic effects of a university vary greatly depending upon the location of the university. In large metropolitan areas, a university or college will have a smaller relative impact on the economy than a university found in a less populated and industrialized regional economy. However, most impact studies of higher learning institutions deal with absolute levels rather than relative effects, and that approach is followed in this study.

The results of this study clearly show that international students are an important source of economic activity in a regional economy. In the application of the model to Michigan Technological University, it was found that international students accounted for $2,693,814 in total direct, and indirect expenditures in the region for the 1986-87 academic year. This translates into $11,319 on a per student basis. The study also demonstrates that international students contributed significantly to deposits in financial institutions in the region. International students held average balances of $1,277, and $1,840 in transactions and savings accounts, respectively, in banks in the region.

It is important to indicate here that this study does not evaluate certain types of activities. It does not take into account long-term effects on the local economy or other economies. An example of long-term effects would be the potential flow of funds for acquiring U.S. produced plant and equipment by foreign decision-makers who are former students. Some international students may remain in the United States or a given region after completion of their education as employees under a special work visa. This study does not attempt to estimate the increased productivity and earning power of these students. Finally, international students at a university may sponsor events or entertainment based upon the cultures of their native countries. These activities most certainly are beneficial to a community, but are considered as intangibles which are difficult to evaluate in an economic sense.

The study which follows is divided into several parts. In the next chapter, a general framework for evaluating the economic contribution of international students (or any group or entity) in a regional economy is developed. The framework is based upon national income accounting concepts and definitions and driven by international student expendi-

tures in the economy. In Chapter 2, the specific set of equations which are to be estimated are developed. Equations for major sectors and subsectors are presented which can be used in any economic impact study. Chapter 3 discusses data sources and data collection and suggests statistical techniques for selecting a sample of students. Chapter 4 presents data which are applicable to Michigan Technological University. Chapter 5 discusses the effects of financial transactions by international students on regional financial institutions and flows of funds. Chapter 6 covers some material which does not directly fit into the impact part of the study but which is interesting in its own right. Finally, Chapter 7 discusses conclusions, implications and applications of the model on a larger scale and to different regions.

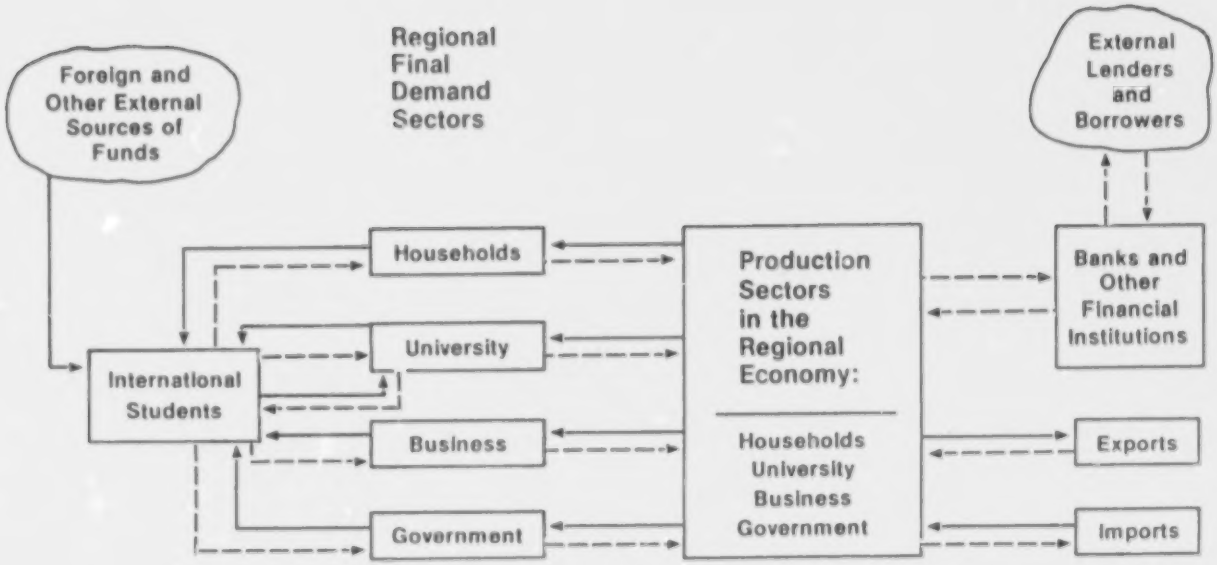

Figure 1. Role of International Students in a Regional Economy

1. A Framework for Analysis

For purposes of assessing the economic impact of a subsector in an economy, a frequently used approach is to examine the expenditures on final goods and services attributable to the existence of that subsector in the regional economy. Using this approach, an expenditures model is developed which is based on the theory of aggregate demand where total spending in an economy is driven by the spending decisions of income recipients in the economy. In such a model, it is assumed that income is the key determinant of spending. In the discussion which follows, a framework for developing a model which estimates the final expenditures associated with international students in an economy is presented.

A representation of the role of international students is illustrated in Figure 1. Figure 1 diagrams the specific position of international students in a typical economy, the major sectors in the economy, the flow of products and expenditures in the economy, and a recognition of the role of banks and other financial institutions in the economy. International students are a part of the household sector and are the focus of attention here. Accordingly, they are highlighted as a stand-alone demand sector in the left of Figure 1. The university, the business, and the governmental sectors are the entities through which the demand for products in the economy from international students is carried.

The large box represents the production (or supply) side of the economy and includes the household sector (a small part), the university itself, the business sector (a large part in most economies), and the government sector. The production part of the economy responds to demands from the spending (or final demand) side of the economy. Imports and exports of goods and services are assumed to flow through the processing or producing sectors of the economy. This assumption is not quite complete because the household sector, for example, may

directly purchase products from outside the region and reduce expenditures domestically. For the sake of simplicity, we assume that these expenditures are not part of domestic demand.

Banks and other financial institutions are a special case in that they provide employment and services as well as a place where funds flow between sectors. For the employment and services aspect, banks and other financial institutions fit in the business sector in the production box. It is the flow of funds function of financial institutions which places them in a separate box on the right hand side of Figure 1. Funds flow into financial institutions in the form of deposits, financial asset purchases, savings, retirement funds, and so forth while funds flow out in the form of loans, dividends, and interest payments. Funds which are placed in savings accounts or checking accounts, for example, reduce the final demand for goods and services in the economy but may serve as a source of funds for financial institutions to lend to borrowers in the regional economy. Funds deposited in regional financial institutions need not necessarily stay in the region. Some funds may be lent to entities outside the region. Likewise, external entities may deposit funds in regional financial institutions. Thus, there are boxes representing potential outflows and inflows of these funds.

Solid arrows represent flows of goods and services while hashed lines represent flows of money. For example, an international student may purchase groceries from a local merchant causing money flows from the international student to the merchant. This will create an inventory depletion for the merchant who should replenish the lost stock of goods. As a result, the demand for inventories by the merchant will increase. The stocks may be provided locally or imported by suppliers. Student purchases thus create additional rounds of spending in the economy and externally. The sum of spending which depends upon the proportion of expenditures locally is called the multiplier effect. It is the overall sum of expenditures through the multiplier effect which gives us the economic impact of international students. (See the next chapter for a formal discussion and derivation of the multiplier in the context of a regional economy.)

The sources of funds for international students are similar to sources of funds for other students except that for some international students funds are received from sources outside the United States. For the regional economy, the actual effect on regional money supplies is the same whether sources of funds are domestic (U.S.) or international. For

the U.S. as a whole, the sources of funding do make a difference because of their effect on the U.S. money supply and balance of payments. If external sources of money are used by international students, then demand for dollars in international money markets increases and causes an increase in the exchange rate for dollars if all other economic variables remain unchanged. Then, when these funds are deposited in U.S. banks, the domestic money supply increases. As we indicated in the introduction, for the U. S. as a whole, international students who have external funds thus raise exports of U.S. services (education) in the balance of payments context. Some international students have domestic and regional sources of funds. This is especially the case for graduate students with scholarships and fellowships. In those cases, a flow of funds occurs from the university to the students as depicted with the wavy lines. The wavy arrow returning to the university shows the flow of labor services for research and teaching activities conducted by the students. These two flows are obviously not the same in value because some students simply receive scholarships or fellowships without specific labor service requirements.

The university is characterized as a separate sector in this model. Actually, in a national income accounting sense, a university is classified as either a part of the household sector for private, non-profit universities or the governmental sector for state-supported universities. It is treated separately here to emphasize the role of students in the overall economy.

With regard to the governmental sector, international students (or any citizen for that matter) do not usually directly buy governmental goods and services. The lack of the exclusion property for governmental goods and services means that individuals, for example, can use streets, public protection, parks, and public education without a direct fee. Thus, international students will be a part (probably very small) of the users of these products and will be a part of the perceived demand for these products from the viewpoint of governmental officials. Likewise, the flow of funds is an indirect one. International students buy products (including housing) which are taxed. Sales and property taxes are typical of these indirect taxes. The arrows between international students and the governmental sector usually do not represent equal flows. It would only be accidental if the values were equal. We do not attempt to estimate either flow, and it is probably a trivial amount. However, the flows of governmental goods and services to a major university would not be trivial. Economic impact studies of universities do not usually estimate these because the flow of services (including elementary and secondary education for the children

of faculty, staff, and students) is recognized as being greater than the flow of revenue. This occurs, of course, because of the tax exempt status of universities.

Given the above general discussion, the basis for examining the economic impact of international students is to assess the direct and indirect effects of the region's final expenditures on goods and services by international students. In essence, it consists of determining the sum of flows associated with the final demand block of sectors in Figure 1. In the chapter which follows, a model of a regional economy is formally developed in a series of equations. For the reader who understands the concepts and relationships associated with Figure 1 and accepts the notion of multiplier effect from direct expenditures in a regional economy, Chapter 2 may be skipped without loss of continuity.

2.
A Regional Economic Impact Model for International Students

A specific model for assessing the economic impact of international students in a region would be based upon those sectors interacting with international students as depicted in Figure 1. Formally, let total expenditures and subsectors of spending by defined as the following:

$$TDE + ISG = ISI + ISU + ISG \qquad \text{Eq. 1}$$

where TDE = Total private sector expenditures in the local economy related to international students
ISI = direct spending by students in the local economy
ISU = spending by the university stemming from international students
ISG = estimated spending by local governments stemming from international students.

Equation 1 is an accounting definition of spending in the region spurred by international students. TDE represents total private spending and is associated with the spending of the demand sectors in Figure 1. However, total expenditures must equal income received in an accounting sense for the sellers of products. And, of income received, a proportion of that income will also be spent in the local economy. Thus, from the multiplier concept, Equation 1 without the governmental component, ISG, should be rewritten as:

$$TDE = ISI + ISU + cr \times TDE \qquad \text{Eq. 2}$$

where cr = the marginal propensity to consume products in the region by spending sectors.

Collecting TDE terms on the left hand side of Equation 2 yields

$$TDE - cr \times TDE = ISI + ISU$$

and

$$TDE = (1/(1-cr)) \times (ISI + ISU) \qquad \text{Eq. 3}$$

Equation 3 is the basic equation for modeling the economic impact of international students in the private sector. It includes direct expenditures by students and the university on behalf of international students as well as induced spending in the business sector to replenish stocks of goods depleted by the progression of spending in the economy via the multiplier. A number of modifications are to be made in this equation as we examine the components such as ISI and ISU in more detail.

ISI can be estimated by using published expenditure data such as the mean student expenditure data mentioned previously or by direct student survey. Student survey data collection is discussed in the next section and, in the case of international students, is probably the best method of gathering ISI data. Data required for ISI will be estimated monthly expenditures, months spent at the university, and the proportion of funds spent in the regional economy. Formally, ISI is proposed as the following:

$$ISI = M \times cri \times (EXPI1 \times I1 + EXP12 \times 12 + EXP13 \times 13) \qquad \text{Eq. 4}$$

where ISI = expenditures by international students in the local economy
M = months spent at the university
cri = the propensity to spend funds in the local economy by international students
EXPI = average monthly expenditures by international students where EXPI1, EXPI2 and EXPI3 represent spending by dormitory students (I1), students living in married student housing (I2) and students living off-campus (I3).

ISU, university related expenditures, requires some further explanation. University expenditures include wages and salaries for faculty and staff, supplies and materials, dormitory costs including food, etc. For wages and salaries (WS) of faculty and staff who are associated with international students, one can simply take a simple proportion of international students to the total student body and apply it against the WS variable. A proportional ratio is associated with the economic concept of average or unit cost per student. Yet as student enrollments vary, one would be interested in the marginal cost per student where the marginal cost is the change in cost as enrollments change. [4] In conjunction with the marginal cost of students, Dresch has suggested that the elasticity of cost per student is 0.25. This means that average costs decrease as enrollments increase and that marginal costs are less than average costs. While we start with a proportional cost concept, later sensitivity tests make use of the elasticity coefficient and the associated variations in WS per student[5]

The model for a university should also take into account the board and housing arrangements of students. Many universities have developed a variety of board and housing options for students. A student might opt for the maximum number of meals or some alternative plan such as living in university housing without utilizing any university food services. Some university expenditures for supplies and materials occur for students who do not live in university housing, and this type of expenditure must be recognized. Thus, ISU can be rewritten as:

[4] A relationship between average costs and marginal costs is the following: If average costs are increasing, then marginal costs are greater than average costs and vice versa for decreasing costs. If average costs are constant, then average costs and marginal costs are the same.

[5] Modifications might be made to the proportion if international students comprise a high proportion of graduate students versus undergraduate students because graduate students have a higher teacher-to-student ratio than undergraduate students.

$$ISU = cr \times p1 \times (I/T) \times WS + p2 \times (I1/T1) \times SM1 + p2 \times (I2/T2) \times SM2 + p2 \times (I/T) \times SM3 \quad \text{Eq. 5}$$

where
- p1 = proportion of wages and salaries paid to faculty and staff residing in the region
- p2 = proportion of supplies and materials funds paid vendors in the regional economy by the university
- I = number of international students
- T = total student body
- WS = wages and salaries of faculty and staff
- I1 = number of international students living in university housing with board option
- T1 = total number of students living in university housing with board option
- I2 = number of international students living in university housing exclusive of board option
- T2 = total number of students living in university housing exclusive of board option
- SM1 = supplies and materials purchased by the university for students in university housing with board option
- SM2 = supplies and materials purchased by the university for students in university housing without board option
- SM3 = supplies and materials purchased by the university for all students. SM3 excludes expenditures for supplies and materials for students in university housing.

The government expenditure equation is proposed as the following:

$$ISG = I \times PCGE \quad \text{Eq. 6}$$

where PCGE = per capita governmental expenditures.

As indicated above, international students directly increase expenditures by governments through their demand for public services but have their incomes reduced by paying taxes. The net effect of these two financial flows (governmental expenditures versus governmental revenues in the form of taxes) is not neutral because of the well-known balanced budget multiplier which is equal to one. Even if these two money flows are equal, there is still a positive expenditure effect on the economy. (See Appendix D for a discussion of this topic.) Hence, ISG is added to ISE to determine total private and public sector spending effects.

Combining Equations 1 through 6 yields the economic impact equation for international students:

$$TDE + ISG = (1/1\text{-}cr)) \times (ISI + ISU) + ISG \qquad \text{Eq. 7}$$

or
$$TDE + ISG = (1/(1-cr)) \times ((M \times cri \times (EXPI1 \times I1 + EXPI2 \times I2 + EXPI3 \times I3) + cr \times p1 \times (I/T) \times WS + p2 \times (I1/T1) \times SM1 + p2 \times (I2/T2) \times SM2 + P2 \times (I/T) \times SM3) + I \times PCGE$$

By determining values for each of the coefficients and variables in Equation 7, one can estimate the direct and indirect expenditures attributable to international students in a given economic region.

3.
Data Sources And Data Collection

Economic impact studies generally use a variety of sources of information and data. Some sources are public records; other sources may be university records while still other sources of data may be previous studies of a given or comparable region. For some data, original collection through a survey may be required. Thus, the operational approaches to collecting data for the development of the model will vary from study to study and will depend upon the intent of the study itself.

The first and most important data to determine are the amount of expenditures by international students in the regional economy. We indicated earlier that budgetary data based on nationwide surveys are available as a guideline for student expenditures. These data are used by school officials in allocating scholarships, student loans, and other forms of financial aid and should be representative of the level of expenditures by students. Yet, these figures do not show the amount of funds spent in the local economy. Furthermore, the budgetary data are based on national averages which can vary significantly from region to region. For student expenditures which are to be used in determining economic impacts in a given region, especially international students, a direct student survey would be most appropriate. Additionally, a student survey allows consideration of other economic variables such as visitor occurrence, automobile purchases, bank account balances, and so forth.

An example of a questionnaire for international students is given in Appendix A. The questionnaire can be administrated in different ways such as personal interviews, telephone interviews, or self-administered via a mailing. In the case of international students, the personal interview is strongly recommended because of possible language problems.[6]

[6] It is strongly advised that the appropriate university liaison officer for international students be a part of the initial student contact.

Obviously, personal interviews require more time and may generate a higher cost per answer, but the response rate will be higher, and the probability of error in answering the questions will be greatly reduced. [7]

All international students at a university can be interviewed or contacted for economic information. Yet at some universities this might require a large number of interviews if the questionnaire is not self-administered. A sample of the population of international students at a university would be a feasible and statistically acceptable means of gathering data. A random sample of all international students could be drawn for observation, or a stratified random sample could be obtained by separating the population of students into nonoverlapping groups (strata) and then selecting a simple random sample from each stratum. In the case of international students, the stratification could be by country or groups of countries in a geographical region. Obviously, some countries will have a higher representation of students at a given university than other countries for whatever reason. In those cases, the countries with the highest student population should be sampled more heavily than those with lower enrollments.

The overall sample size requires a bit of statistical estimation. If one can determine a rough approximation of the average expenditures of international students and possibly the standard deviation of this value, one can scientifically determine the minimum sample size for a given, desired confidence interval for the data. The results of this study provide the information (mean and standard deviation of expenditures) which could be used to determine an appropiate sample size. For this study, a sample size of 35 was taken from a population of 238 international students. [8]

Expenditures by the university, EIU, will be driven by the budget of the university. Faculty and staff wages and salaries will be a major component of the budget owing to the service nature of the university. Likewise, university expenditures for supplies and materials, maintainence, utilities, and services are a part of the university budget. The expenditures for this category in the budget should be a straightforward

[7] For a discussion of designing questionnaires, see Babbe, 1973.

[8] For the statistical procedure in determining the sample size for a finite population, see Appendix B and Mendenhall, Ott and Schaeffer, 1971.

value. Problems arise in determining the proportion of this type of expenditure in the local economy. Usually, the proportion is relatively small (10% to 20%) for remote geographic locations and significantly higher (70% to 80%) for major metropolitan areas. Some universities keep records of the location of vendors or the disbursement of funds by location or region. Obviously, these data would be very useful in an economic impact study. Alternatively, the best guess of university officials is simply the next best data source that one could use short of a major invoice and purchase order examination. Capital expenditures may vary from year-to-year which poses a consistency problem. The year an impact study is conducted may be a large or small capital expenditure year and may bias the results of the study. Hence, one should be cautious in utilizing capital expenditures data.[9]

As indicated before, the expenditures incurred by local governments on behalf of international students are relatively small as they are for any group of university students. Many expenditure components of local governments are driven by population where population refers to permanent residents who are also voters. Funding sources at higher levels of government may look to a number of other variables such as poverty incidence, housing demand and needs, development potential, traffic flows and so forth. Students, in general, may play a part in these budgetary components for local governments, but usually it is indirect through the university or faculty themselves. Thus, it is assumed (simply because of the lack of reliable data) that government expenditures on international students are per capita based. How much governments are expected to spend on students is simply total governmental expenditures divided by the population.

[9] The main financial officer of the university can be very helpful in securing this type of data.

4. Model and Data Application to the Specific Case of MTU

The above model is applied to a specific university - Michigan Technological University (MTU) - in this study. MTU is located in a relatively remote area in the Upper Peninsula of Michigan. Its location implies that it is not an urban area, and thus it is critical to determine marginal propensities to spend for the household sector and the university itself. These values and other data are presented in the Tables 1-8 in this chapter and are discussed with reference to the ultimate impact of international students at MTU on Houghton County, Michigan.

Tables 1-4 are used to derive expenditures by international students, ISI, in the local economy. Table 1 shows summary data from the sample survey. The expenditures toward dormitory housing and married student housing do not go directly into the economy but are indirect expenditures from the university's budget. The remaining figures in Table 1 (lines 2, 3, 5, 6 and 7) represent purchases of various categories of goods and services by international students on a monthly basis. Expenditures by dormitory students in the local economy are relatively low because of the lack of any need for goods other than basic necessities. Thus, $69 is the amount spent monthly in the local economy.

Line 4 shows the average monthly expenditures on housing by students living in married student housing. The figure has a low standard deviation because of the common rent students pay for this type of housing. (There is some variation because single students living in married student housing pay a different rate than married students.) Line 5 represents the housing expenditures by students living off campus with an average of $170 per month. The standard deviation is $110 indicating a wide variation in payments. The range of rent payments was from $80 to $600, the latter being for a graduate student who had returned to school

with a large family. Average monthly expenditures on food and beverages by students living in housing without board were $162 as indicated on line 6. It is assumed that students living in married student housing and off campus have the same expenditures for food and beverages and other expenses. The standard deviation is 91 with a range of $80 to $500. Finally, average monthly expenditures on all other expenses was $145 with the indicated standard deviation of $10.

Table 1

AVERAGE MONTHLY EXPENDITURES BY GROUPS OF INTERNATIONAL STUDENTS

1. Average Monthly Expenditures on Housing by Dormitory Students	$267
2. Average Monthly Expenditures on Other Food by Dormitory Students	35
3. Average Monthly Expenditures on All Other Expenses by Dormitory Students	34
4. Average Monthly Expenditures on Housing by Students in University Married Student Housing (MSH)	227
5. Average Monthly Expenditures on Housing by Students Living Off Campus	170
6. Average Monthly Expenditures on Food and Beverages by Students in MSH	162
7. Average Monthly Expenditures on All Other Expenses by Students in MSH	145

Source: Student survey.

Item 2 + Item 3 = EXPI1
Item 6 + Item 7 = EXPI2
Item 5 + Item 6 + Item 7 = EXPI3

Utilizing the international student residence figures for the 1986 fall enrollments (Table 2), the assumptions pertaining to the average residence period and percentage of expenditures spent in the local economy, one can determine the estimated, annual per student expenditures in the local economy as indicated in Table 3. Dormitory students directly spend $748 annually in the local economy. Non-dormitory students spend a larger amount reflecting the extra food and other miscellaneous expenditures. $3,325 is estimated to be spent by married student housing students, while off campus students spent $5,166 annually in the local economy.

Table 2

HOUSING LOCATION OF INTERNATIONAL STUDENTS, 1986 - 87

Number of Students Living in Dormitories on Campus (I1)	61
Number of Students Living in Married Student Housing on Campus * (I2)	77
Number of Students Living Off Campus (I3)	100
Total (I)	238

Source: University records.

*Includes both married students with families and single individuals who rent married student housing.

Table 3

AVERAGE YEARLY DIRECT EXPENDITURES IN THE LOCAL ECONOMY BY GROUPS OF INTERNATIONAL STUDENTS AT MTU

Average Yearly, Direct Expenditures Per Student Living In University Dormitories	$748
Average Yearly, Direct Expenditures Per Student Living In MSH (Excluding Rent)	3,325
Average Yearly, Direct Expenditures Per Student Living Off Campus (Including Rent)	5,166

Sources: Student survey for M and cri, Table 1.

Assumptions:

1. Students average11.4 months (M) of the year at MTU.
2. Students spend 95% (cri) of their non-university housing funds in the local economy.
3. The average monthly expenditures from Table 1 exist for all groups of international students.
4. Monthly figures are taken from survey data.

Table 4 shows the total expenditures in the local economy. The total of these figures is $818,253 which is the figure for ISI in the economic impact model.

Table 4

TOTAL DIRECT EXPENDITURES BY INTERNATIONAL STUDENTS IN THE LOCAL ECONOMY

Total Direct Expenditures For International Students Living in University Dormitories* (M x cri x EXPI1)	$ 45,628
Total Direct Expenditures For International Students Living in MSH* (M x cri x EXPI2)	256,025
Total Direct Expenditures For International Students Living Off Campus* (M x cri x EXPI)	516,600
Total (ISI)	$818,253

Sources: Tables 2 and 3.

*Assumption: Total direct expenditures are calculated by taking the values in Table 3 times the number of students in each group from Table 2.

Tables 5 and 6 are data taken from University records for student enrollments and various classes of expenditures. For MTU, total expenditures were $68,497,401 and were broken down into the subcategories in the Table. MTU keeps records of the proportion (p2) of funds spent in the local economy for Services, Supplies, and Mainenance which is a very important figure for impact studies. For MTU, the figure was 0.47 for the 1986-87 academic year.

Table 5

MTU STUDENT ENROLLMENTS AND HOUSING LOCATION

Undergraduates by Class	
Freshmen	1,509
Sophmores	1,311
Juniors	1,464
Seniors	1,464
Graduate Students	**338**
Special	**77**
Total Students (T)	**16,163**
Housing Location	
University Dormitory (T1)	2,570
University Married Student Housing Married Students Plus Single Students (277+201=478=T2)	478
Off Campus (T3)	3,115

Source: University records.

Table 6

CLASSES OF EXPENDITURES BY MICHIGAN TECHNOLOGICAL UNIVERSITY 1986-87

Total Expenditures by MTU			**$68,497,401**
Salaries/Wages		$35,010,972	
Fringe Benefits		7,892,948	
Services, Supplies and Maintainence (SSM)		25,593,482	
Services, Supplies and Maintainence (SSM) Categories*			
Cost of Food in Dormitories		$1,151,876	
Operating Expenses in Dormitories		3,787,733	
Married Student Housing Operating Expenses		600,984	
From the above data, one can derive the following variables:			
WS:	Wages and Salaries of Faculty and Staff (Excludes Fringe Benefits which are assumed to be paid to entities outside the region.)	$35,010,972	
SM1:	SSM for dormitory students*	4,939,609	
SM2:	SSM for married student housing*	600,984	
SM3:	Remaining SSM excluding SM1 and SM2*	20,052,889	
p2:	Proportion of SSM spent in local economy	0.47	

Source: University records

*Subtotals of SSM

Table 7 is a summary of the variables which are used in estimating the economic impact of international students as well as their sources and values. Basically, these values are substituted into Equations 1-6 to find the overall impact figure calculated from Equation 7. Table 8 presents the total economic impact estimates of international students at MTU on the local economy. For the 238 international students, their impact on direct and indirect spending was $2,693,814 for the 1986-87 academic year. On a per capita basis, this translates into $11,319 when one takes into account the multiplier effect in Equation 7. These figures are conservative estimates based upon available data.

Table 7

PARAMETERS AND VARIABLES FOR ECONOMIC IMPACT ASSESSMENT

Variable	Value	Equation where initially presented	Location and Source
cri	0.95	4	Student survey
M	11.4	4	Student survey
EXPI1	$69	4	Table 3, Student survey
EXPI2	$307	4	Table 3, Student survey
EXPI3	$477	4	Table 3, Student survey
ISI	$818,253	4	Table 4, Student survey
I	238	5	Table 2, University records
I1	61	4	Table 2, University records
I2	77	4	Table 2, University records
I3	100	4	Table 2, University records
T	6,163	5	Table 5, University records
T1	2,570	5	Table 5, University records
T2	478		Table 5, University records
T3	3,115	5	Table 5, University records
cr	0.34	2	Previous survey
p1	0.90	5	Previous survey an university records
p2	0.47	5	University records
WS	$35,. 010,876	5	University records
SM1	$4,939,609	5	Univeristy records
SM2	$600,984	5	University records
SM3	$20,052,889	5	University records
PCGE	$500	7	Local governmental records

Table 8

ECONOMIC IMPACT ESTIMATE AND SENSITIVITY TO VARIATIONS IN INTERNATIONAL STUDENT ENROLLMENTS

Direct and Indirect Economic Expenditures in Houghton County from International Students Enrolled in 1986-7 Academic Year at MTU	$2,693,814
Per Capita Direct and Indirect Expenditures (238 total international students)	11,319

Sensitivity Impacts

Case 1. International student enrollments increase by 10% while domestic student enrollment remains constant. Assumes an elasticity of cost for faculty and staff of 0.25 per student. Expenditures for SSM in dormitories are assumed to remain constant. Expenditures for other SSM increase proportionately. Off campus expenditures are assumed to increase proportionately.

Total Expenditures with 10% enrollment increase	$2,896,043
Per Capita Expenditures with 10% enrollment increase (262 international students)	$11,054

Case 2. International student enrollments increase by 100% with all assumptions the same as in Case 1.

Total Expenditures with 100% enrollment increase	$4,756,025
Per Capita Expenditures with 100% enrollment increase (476 international students)	$9,992

To examine the economic effects of changes in enrollments of international students at the university in this study, two alternative enrollments (Cases) were tested. Assumptions underlying these data were 1) increases by 10% to 262 students rather than 238 students and by 100% to 476 students, 2) faculty and staff wages and salaries increase by Dresch's elasticity of cost coefficient of 0.25, 3) the proportion of international students in campus housing remains the same (assuming current student housing capacity continues), 4) SM1 and SM2 do not change (this assumption means that while international students increase, domestic students in campus housing decrease), and 5) direct international student expenditures remain the same per student. Taking

into account these assumptions, Table 8 presents the increases in total direct and indirect expenditures accounted for by international students in total and on a per capita basis. Per capita expenditures decrease (as enrollments increase) to $11,054 for Case 1 and to $9,992 for Case 2. The decrease in per capita expenditures occurs because of the wage and salary elasticity coefficient. An increase in enrollments does not increase wages and salaries proportionately but by a factor which is less than one. However, per capita expenditures still remain near $10,000 even in Case 2. More will be said about the macro implications of this finding in the Summary chapter.

5. Financial Data

The bank deposit model is separate from the expenditures model and applies to financial assets rather than expenditures on real goods and services. Yet, regional banks and other depository institutions use deposits as a source of funds for making loans in a region or for acquiring other interest-bearing assets. Thus, flows of deposits into financial institutions reflect a form of potential economic activity in that region. The limit of regional lending by banks depends upon the regional demand for funds and reserve requirements imposed by regulatory agencies. If there is little demand for funds by borrowers in the region, new deposits may simply be used to acquire interest-bearing assets originating outside the region. On the other hand, if there is a strong regional demand for borrowed funds, new deposits can generate a multiplier effect on deposits in the region limited by reserve requirements and money outflows from the region. The limit to deposit expansion is the money multipler as indicated by the following equation:

Deposit Creation Limit = (1/Reserve Requirement) x New Deposits.

Thus, if reserve requirements are 0.12 as they now are on demand deposits, then the maximum potential deposit expansion is 1/0.12 or 8.33 for each new transactions deposit. [10]

[10] The money multiplier is a maximum value and ignores excess reserve holdings by banks, time deposit leakages and currency holdings by depositors in the region. These factors would lower the deposit expansion potential. In fact, the lower limit is the amount of the actual deposit itself for any bank and for any banking system.

Table 9 presents a summary of the holdings of transactions and avings deposits balances held by international students in the sample ken at MTU. The average transactions balance held by international udents was $1,277. This figure represents an average of the beginning-of-the-period balance when deposits are made and end-of-the-period balance when deposits are at their minimum where the period pertains to

Table 9

TRANSACTIONS DEPOSITS AND SAVINGS DEPOSITS OF INTERNATIONAL STUDENTS

Average Transactions Deposit Balance Held by International Students in Houghton County Financial Institutions (Standard Deviation)	$1,277
(32 students out of 35 in sample)	(1,055)
Average Transactions Deposit Balance Held by International Students Outside Houghton County (5 students out of 35 in sample)	$1,440 (1,291)
Average Savings Deposit Balance Held by International Students in Houghton County Financial Institutions	$1,840
(15 students out of 35 in sample)	(1,195)
Average Savings Deposit Balance Held by International Students Outside Houghton County	$3,471
(7 out of 35 in sample)	(1,852)
Estimated Average Total Transactions Balances Held by International Students in Houghton County Financial Institutions* (218 students)	$278,386
Estimated Average Total Savings Deposit Balances Held by International Students in Houghton County Financial Institutions* (102 students)	$188,496

* Assumptions: 1. The proportion of students holding transactions and savings deposits in the sample is the same for the population of international students. 2. The population of international students holds the same average balance as the sample.

the payment period for the student.[11] Assuming the proportion of students holding transactions and savings deposits in the local economy is the same as for the sample and that their average balances are the same, the total deposits that international students have in local banks are $278,386 and $188,496, respectively. If these funds were lent in the local economy and there were no leakages of funds as indicated above, total deposits in the region in both cases would be over 8 times these figures.

With regard to borrowing, international students simply do not borrow from domestic financial institutions (as one would expect). Of the 35 students interviewed in this study, none admitted that they had borrowed any funds. This is an obvious conclusion because international students are not domestic residents, by definition, and bankers would be reluctant to lend to non-residents. However, it does imply that international students are suppliers of funds but not users of funds with regard to financial flows and money markets.

[11] For example, if a student receives one $5,000 payment which is deposited in a bank at the beginning of the term and has $500 in the transactions balance at the end of the term, then the average balance will be between these two figures for the three-month period. The student estimates the rate of expenditures and gives the best guess of the average balance for the term or month or pay period.

6.
Demographics, Visitors, and Miscellaneous

International students at Michigan Technological University have characteristics which make them somewhat unique from the traditional student at the university. MTU students are primarily undergraduates fresh out of secondary educational institutions. The international students at MTU are primarily graduate students. Out of the 238 international students at MTU, 131 are graduate students while the remaining students are undergraduates. The total graduate enrollment at MTU was 418 for the 1986-87 academic year suggesting that MTU has a comparable proportion of international students in the graduate student population as is found in other universities in the United States. This also explains why the average age of the sample of international students was 27.2 years reflecting a higher proportion of graduate students and older students in the international student body.

One frequently mentioned economic variable for impact studies of a university on an economy is visitors to an area. It is assumed that visitors reside in motels or hotels, dine out at restaurants, purchase goods and generally act as external consumers in the region. It was found in this study that international students have few visitors and what few visitors do come into the region are not big spenders. International students had only 1.02 visitors during the year on the average and in only one case out of 20 did the visitors stay in a motel or hotel. Because the number of visitors was so small, it was simply ignored in the expenditures model. If it is suspected that international students entertained a large number of visitors, then the variable should be added to the multiplier model and data in Chapters 2 and 4.

In this study, an item of interest was the purchase and use of automobiles in the region. The purchase of new automobiles would be

counted as a direct expenditure in the regional economy and would lead to a multiplier effect just as other expenditures. The purchase of used automobiles does not count as a direct expenditure in the national income accounting framework. Yet, international students do purchase automobiles, especially used automobiles, and this major consumption expenditure should be measured. In this study, 22 international students out of the sample of 35 owned automobiles. Of the 22, 12 international students purchased used automobiles locally from either a dealer or a private party. (One student purchased a new auto.) The average price per auto was $2,647. Thus, international students do indeed purchase consumer durable goods, albeit used ones in the case of automobiles. While this expenditure is not directly counted in the regional income accounts as a demand for newly produced goods, it is a significant expenditure for one segment of the economy.

With regard to the future plans of the sample of international students, a mixture of responses was recorded. Thirteen international students planned to return to their home country and work in the business sector; 5 planned to work for their home government; 15 had intentions of becoming educators or instructors in their home country and 2 students were not sure of their plans. 22 students indicated their willingness to assist their home country with international trade, especially with the United States. 13 students did not feel that they had the experience or qualifications to carry out this type of economic activity. Actually, the question pertaining to international trade was included to encourage international students to consider the opportunities for individuals with their training and educational experiences. As suggested in the introduction, these individuals will indeed be making decisions which ultimately influence international trade of their countries with the United States, in particular, and the rest of the world, in general.

7. Summary and Opportunities for Future Research

The objective of providing a framework for evaluating the economic effects of international students in a region has essentially been met. A general model has been developed and can be utilized in a variety of economies and regions. The generic model was applied to a specific case at Michigan Technological University. It was found that the direct and indirect spending effects of international students totaled $2,693,814 for the 1986-87 academic year and on a per capita basis was $11,319. (See Table 8.) Deposit balances were found to average $1,277 and $1,840 per student for transactions and savings accounts, respectively. Clearly, international students do have a significant economic impact upon this Michigan regional economy.

The data gathered in this study are the first of their kind and represent an attempt to apply the model to a particular university in a given area. The model and data are short-run in nature and could be expanded for longer run effects as data are gathered over time. It is anticipated that this model will be applied to a broad spectrum of educational institutions in a variety of regional economies. The building up of this type of data will lead to a more complete understanding of the economic role of international students in regional economic activity.

On a larger scale, international students as a group in the United States create an economic impact. To the extent that external funds support these students and the funds do not reduce other exports of U. S. products, a multiplier effect is felt in the United States. In this case, the marginal propensity to consume out of disposable income would be approximately 0.9 making the overall multiplier larger than what it would be in the regional economy alone. On the other hand, international

students supported by domestic funds do not necessarily generate additional spending in the aggregate U. S. economy but may cause a redistribution between regions,. depending upon the concentration of international students at particular types of universities. Additionally, it was demonstrated in the study that a significant increase in international student enrollments does not necessarily mean a proportionate increase in final expenditures in the United States because of the low cost elasticity associated with students in higher education.

Appendix A

ECONOMIC IMPACT QUESTIONNAIRE
INTERNATIONAL STUDENT SURVEY - 1987
School of Business and Engineering Administration
Professor James R. Gale

Instructions:

The questionnaire is designed to determine the economic impact of international students at Michigan Technological University on Houghton County. You may wish to examine the map of Houghton County before answering questions.

Please answer the questions taking into account your activities and expenditures during the 1986-7 academic year.

Name_____ Age_____
Date_____

1. Personal

1.1. Home Country_____

1.2. University Status ____Graduate Student ____Undergraduate ____Special Student ____Other

1.3. Marital Status ____Single _____Not Single

1.4. Major area of study_____

1.5. If you are not single, how many people live in your family household: _____People

1.6 If you are not single, how many children from your family attend public, elementary, or secondary schools in Houghton County? _____Children

2. Residence

2.1. Location of your residence while a student at MTU.
(Married student housing is considered an on-campus residence.)
____On Campus ____Off campus in Houghton County ____Other

2.2. If off campus in Houghton County, which one of the following categories describes your residence while attending MTU?
____Rent ____Own House ____Living with friends or relatives
____Fraternity or Sorority ____Other

2.3. Approximately how many months during the year did youstay at your MTU place of residence? (If you leave your university residence during summer and term breaks or Thanksgiving, Christmas, or Easter holidays, then you are considered as not at the university. On the other hand, if you leave the university because of university business such as a field trip or athletic trip, then do not count it as an absence.)
_____Months

2.4. If less than 12 months, then where did you spend this vacation or non-university time?
_____Return to home country
_____Visit friends or relatives in the United States
_____Visit friends or relatives in some other country
_____Co-op or Voluntary Work Program
_____Other

2.5. What is your means of travel? (More than one answer may be chosen.)
____Fly from Houghton County airport
____Drive to airport in major city and fly
____Drive to destination
____Other

3. Expenditures

3.1. Does your housing expenditure include substantially all food expenses? (A student living in a residence hall or in some fraternity or sorority housing pays for room and food together.)
____Yes ____No

3.2. If you answered yes, please estimate your average monthly expenditures on the following categories:
$_____Housing $_____Other Food and Beverages
$_____All Other Expenses including books and supplies

3.3 If you answered no, please estimate your average monthly expenditures on the following categories:
$_____Housing $_____Food and Beverages $_____
_____All Other Expenses including books and supplies

3.4 Of your total expenditures on housing, food and beverages and all other expenses, approximately what percentage of these expenditures are outside Houghton County?
____Percentage

3.5. Do you own an automobile or pick-up?____Yes ____No
3.6. If yes, did you purchase the car or vehicle from a dealer in Houghton County? ____Yes ____No
3.7. If yes, approximately what did you pay for the car? $_____

4. Visitors from Outside Houghton County

4.1. How many times during the last 12 months did you have visitors from outside Houghton County? ____Number of times
4.2. How many adults visited you, on the average, on each occasion? ____Number of visitors
4.3. Approximately how many days did each adult stay? ____Number of days
4.4. On how many occasions did visitors stay in a motel or hotel? ____Number of occasions
4.5. Approximately how many days did the visitors stay in a motel or hotel? ____Number of days

5. Sources of income and funds

5.1. Taking into consideration income from all sources, what was the amount of your income this past year?
____Less than $5,000
____Greater than $5,000 but less than $10,000
____Greater than or equal to $10,000
5.2. Did you borrow any money this past year? (Borrowing would include open notes, mortgages, credit cards, etc.) ____Yes ____No
5.3. What are your sources of income and funds?
United States:
_____Grants and scholarships from MTU
_____Grants and scholarships from other funding agencies in the United States
_____Research and teaching assistantships at MTU
_____Employment other than research and teaching assistantships from MTU (Parttime, fulltime, spouse employment, etc.)
_____Gifts from individuals in the United States
_____Other including savings International:
_____Grants and scholarships from international sources (The sources could include foreign governments, foreign funding agencies, etc.)
_____Gifts from relatives and friends in other countries
_____Parttime or fulltime employment in other countries
_____Other including savings

5.4. If some or all of income or funds are from international sources, do you receive payment in dollars or some other international currency? _____Dollars _____Other currency

5.5. If paid in some other currency, do you exchange the money for dollars in Houghton County or some other location?
_____Houghton County
_____Some other location

5.6. Who pays for your tuition? _____MTU _____Non-MTU sources

6. Transactions (checking) accounts and savings accounts

6.1. On the line, indicate the average amount in checking accounts in financial institutions (banks, savings and loan companies, credit unions, etc.) in Houghton County and the average amount in checking accounts in financial institutions outside Houghton County.

Houghton County

0		1000		2000	3000

Outside Houghton County

0		1000		2000	3000

6.2. On the line, indicate the average amount of savings deposits and time certificates that you have in financial institutions in Houghton County and the average amount of savings deposits and time certificates that you have in financial institutions outside Houghton County.

Houghton County

0		1000		2000	3000

Outside Houghton County

0		1000		2000	3000

7 Future Plans After Completion of Current U. S. Education

7.1 Work for business in home country ____Yes ____No ____Not sure
7.2 Work for home government ____Yes ____No ____Not sure
7.3 Educator or instructor in home country ____Yes ____No ____Not sure
7.4 Remain in United States for further study ____Yes ____No ____Not sure
7.5 Would you be willing to assist your home country in international trade especially with the United States? ____Yes ____No ____Not sure

Appendix B
Selection of a Sample Size

The selection of a sample size of international students to be interviewed for an economic survey is a bit of an arbitrary process where no previous data exist. Basically, the choice of the sample size, n, for any study depends upon the limitations of time and cost in gathering data from the sample versus reducing the probability of making incorrect inferences about the population of international students from the sample. It is desirable to have a large sample size, but this may require a good deal of time and effort during the interviewing process and raise the cost of the study. On the other hand, one wishes to secure as much reliable information about the population as is possible given the constraints of time and funds.

As a rule of thumb, a sample size of at least 30 is desirable because one can use the Standard Normal distribution for assessing probabilities,according to Freund and Williams. A smaller sample size can be utilized, but the Student's t-distribution must be used in constructing confidence intervals and making inferential statements, and a degree of reliability is lost from a smaller sample.

One can estimate a sample size by utilizing the following simple formula which is taken directly from Mendenhall, Ott and Scheaffer and assumes a finite population:

$$n = N \times S2/(((N - 1) \times (B2/4)) + S2)$$

where

n = the unknown sample size
N = the population of international students at the university
S2 = the population variance
B = the bound on the interval or the difference between the highest and lowest values of the confidence interval itself.

N is known from university records and for this study was 238. B is chosen by the experimenter. In our case, B was arbitrarily chosen to be $50 with the assumption of a 95% confidence interval. S2, the population variance must be estimated from existing data or previous studies. (This study can be used as a source for the variance in future studies.) Because there are no previous studies along these lines, an alternative procedure is to roughly approximate the range of expenditures, find the standard deviation from this figure and then square the estimated standard deviation for the variance. Obviously, some reasonable judgment must used in determining the range. For the MTU example, it was estimated that students would have a normal spread in expenditures from $400 to $800, making the range $400. Since the range is approximately equal to 4 standard deviations by the Empirical Rule, the standard deviation is found by simply dividing the range by 4, yielding a value of $100 for the standard deviation. Thus, the population variance, S2, was estimated to be $10,000.

Substituting these figures into the above equation yields a desirable sample size of 15. This is a rather low sample size, given the desired minimum of 30 students. Hence, it was determined to use a sample size of 35 students for this study.

Appendix C
Distribution of Countries For Sample of International Students

Country	Number of Students
Canada	4
Chile	1
Finland	1
Hong Kong	1
India	3
Iran	1
Jordan	1
Lebanon	1
Liberia	1
Malaysia	2
People's Republic of China	8
Peru	1
Singapore	1
Spain	1
Sri Lanka	1
South Korea	3
Taiwan	3
West Germany	1
Total	**35**

Appendix D
The Balanced Budget Multiplier

The balanced budget multiplier is a concept which arises from the direct positive contribution of governmental expenditures on total spending in a regional economy and the reduction in expenditures associated with taxes collected by governments from spending units in a regional economy. In the simplest form of the model, assume that a single government exists in a regional economy and that it carries out programs and services in that region by hiring individuals and buying products in the region. Assume that the government uses taxes as a source of revenue to finance these activities and that these taxes equal expenditures. Further assume that the regional economy is a subregion in a larger economy such that interest rates and prices are determined outside the region and are taken as given by decision-makers in the region itself.

In this context, an expenditure of X dollars by the regional government creates X direct expenditures plus indirect expenditures via the expenditure multiplier. However, taxes reduce gross income by X dollars in the private sector.

As a result, the reduction in income by X dollars from the private sector does not completely offset the governmental spending because part of income in the private sector goes for saving, it is assumed. Hence, governmental expenditures rise by X dollars creating a positive multiplier effect while the private sector reduces spending initially by the marginal propensity to consume (mpc) times the X tax dollars creating a negative multiplier effect on expenditures on the economy. Since the mpc is less than one and is approximately 0.9, a balanced budget by a regional government is not neutral in its effect on the economy. Its effect is equivalent to the expenditures by the government itself and does not yield a multiplier impact on the economy under balanced budget rules of fiscal operaton. For a thorough technical discussion of the balanced budget multiplier, the curious reader might consult the reference, *Macroeconomics* by Dornbusch and Fischer (1987).

References

Babbie, Earl R. SURVEY RESEARCH METHODS. Belmont, California: Wadsworth Publishing Company, 1973.

College Entrance Examination Board. "Manual for Student Aid Administrators: 1987-88 Policies and Procedures." New York, 1986.

Caffrey, John and Herbert H. Isaacs. ESTIMATING THE IMPACT OF A COLLEGE OR UNIVERSITY ON THE LOCAL ECONOMY. Washington, D. C.: American Council on Education, 1971.

Dornbusch, Rudiger and Stanley Fischer. MACRO-ECONOMICS. Fourth Edition. New York: McGraw-Hill, Inc., 1987.

Dresch, Stephen P. THE ECONOMICS OF FOREIGN STUDENTS. New York: Institute of International Education, 1987.

Freund, John E. and Frank J. Williams. ELEMENTARY BUSINESS STATISTICS: THE MODERN APPROACH. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972.

Gale, James R. and Anil B. Jabekar. "The Economic Impact of Michigan Technological University on Houghton County." Monograph published by the Bureau of Industrial Development, Houghton, Michigan, 1975.

Mendenhall, William, Lyman Ott and Richard L. Scheaffer. ELEMENTARY SURVEY SAMPLING. Belmont, California: Wadsworth Publishing Company, 1971.

IIE RESEARCH SERIES

Readers of this IIE Research Report may be interested in earlier titles in the series. They are available through the Educational Resources Information Center (ERIC) Clearinghouse on Higher Education, One Dupont Circle, NW, 630, Washington DC 20036-1183.

Additional single copies of this report can be ordered directly from IIE if accompanied by a check for $4.00 for postage and handling. Orders should be directed to:
Publications Service
Institute of International Education
809 United Nations Plaza
New York, NY 10017

Report #1
ABSENCE OF DECISION:
Foreign Students in American Colleges and Universities

Craufurd D. Goodwin
Michael Nacht

Report #2
BLACK EDUCATION IN SOUTH AFRICA:
The Current Situation

David Smock

Report #3
A SURVEY OF POLICY CHANGES:
Foreign Students in Public Institutions of Higher Education

Elinor G. Barber

Report #4
THE ITT INTERNATIONAL FELLOWSHIP PROGRAM :
An Assessment After Ten Years

Marianthi Zikopoulos
Elinor G. Barber

Report #5
FONDNESS AND FRUSTRATION
The Impact of American Higher Education on Foreign Students with Special Reference to the Case of Brazil

Craufurd D. Goodwin
Michael Nacht

Report #6
INTERNATIONAL EXPERTISE IN AMERICAN BUSINESS:
How to Learn to Play with the Kids on the Street

Stephen J. Kobrin

Report #7
FOREIGN STUDENT FLOWS:
Their Significance for American Higher Education

Elinor G. Barber, Editor

Report #8
A SURVEY OF POLICY CHANGES:
Foreign Students in Public Institutions of Higher Education 1983-1985

William McCann Jr.

Report #9
DECLINE AND RENEWAL:
Causes and Cures of Decay Among Foreign-Trained Intellectuals and Professionals in the Third World

Craufurd D. Goodwin
Michael Nacht

Report #10
CHOOSING SCHOOLS FROM AFAR:
The Selection of Colleges and Universities in the United States by Foreign Students

Marianthi Zikopoulos
Elinor G. Barber

Report #11
THE ECONOMICS OF FOREIGN STUDENTS

Stephen P. Dresch

Report #12
THE FOREIGN STUDENT FACTOR:
Their Impact on American Higher Education

Lewis C. Solmon
Betty J. Young

Report #13
INTERNATIONAL EXCHANGE OFF-CAMPUS:
Foreign Students and Local Communities

Mark Baldassare
Cheryl Katz

Report #14
MENTORS AND SUPERVISORS:
Doctoral Advising of Foreign and U.S. Graduate Students

Nathaliu Friedman

Report # 15
BOON OR BANE:
The Impact of Foreign Graduate Students in U.S. Engineering Programs

Elinor G. Barber
Robert P. Morgan

Report #16
U.S. STUDENTS ABROAD:
Statistics on Study Abroad 1985/86

Marianthi Zikopoulos

INSTITUTE OF INTERNATIONAL EDUCATION
1919 - 1989
70 Years of Leadership
in International Educational Exchange

INSTITUTE OF INTERNATIONAL EDUCATION
809 UNITED NATIONS PLAZA
NEW YORK, N.Y. 10017